

Applicant: Lipponen et al.  
Application No.: 10/559,598  
Art Unit: 1791

### Claim Listing

1-70. (canceled)

71. (previously presented) A paper or board web surface sizing apparatus comprising:

- a paper or board web having a first side and a second side, and pores leading from the first side and the second side into inner layers of the web, the web following a path through the apparatus defining a running direction;
- a turning roll which engages the web to cause the web path to follow a curve, the web having a first side facing away from the turning roll and a second side which engages the roll;
- a first vacuum nozzle arranged to suck air from the web after the turning roll to form an vacuum in pores in the web; and
- an applicator for applying surface size to the web first side, the applicator being positioned after the vacuum nozzle.

72. (previously presented) The apparatus of claim 71 further comprising a trough disposed at the curve and arranged to guide a main part of an air flow traveling with the web, away from the web first side.

73. (previously presented) The apparatus of claim 72 wherein the first vacuum nozzle is arranged to suck air from the first side of the web after the trough.

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74. (previously presented) The apparatus of claim 73 further comprising a second vacuum nozzle arranged after the turning roll on the second side of the web, the second vacuum nozzle directed to cause vacuum in the pores of the web.

75. (currently amended) The apparatus of claim 74 further comprising a first overpressure nozzle positioned after the applicator and arranged to put pressure on the first side of the web and a second overpressure nozzle arranged to ~~arranged to~~ put pressure on the second side of the web after the applicator.

76. (previously presented) A method of applying surface size to a paper web having inner layers with pores therein comprising the steps of:  
guiding an unsupported paper web past a spray coater and spraying a size solution onto a first side of the web; and  
following spraying the size solution onto the first side, guiding the unsupported paper web around a vacuum roll and applying to a second side opposite the first side a vacuum directly to the unsupported paper web of between 5 kPa and 80 kPa creating an underpressure that sucks the size solution applied onto the first side of the web into pores in inner layers of the web.

77. (previously presented) The method of claim 76 further comprising drying the first side of the paper web with an infrared or impingement dryer over a suction zone of the suction roll.

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78. (previously presented) The method of claim 76 further comprising the steps of:  
guiding the unsupported paper web through a non-contact dryer after guiding the  
paper web around the vacuum roll;  
guiding the unsupported paper web past a second spray coater and spraying a size  
solution onto the second side of the web; and  
following spraying the size solution onto the second side, guiding the unsupported  
paper web around a second vacuum roll and applying to the first side, opposite  
the second side, a vacuum directly to the unsupported paper web of between 5  
kPa and 80 kPa.

79. (previously presented) A method of applying surface size to a paper web  
having inner layers with pores therein comprising the steps of:  
guiding an unsupported paper web past a spray coater and spraying a size solution  
onto a first side of the web; and  
simultaneously while spraying the size solution onto the first side, guiding the paper  
web around a vacuum roll and applying to a second side opposite the first side  
a vacuum directly to the unsupported paper web of between 5 kPa and 80 kPa  
before, during, and after spraying the size solution onto the first side of the  
web to create an underpressure that sucks the size solution applied onto the  
first side of the web into pores in inner layers of the web.

80 – 84. (canceled)